

### III. SURFACE WATER ASSESSMENT

#### H. PUBLIC HEALTH/AQUATIC LIFE CONCERNS

##### 1. Size of Waters Affected by Toxicants

As part of the CWA-mandated triennial water quality standards and criteria review, OWR finalized and adopted changes to the Water Quality Regulations in August 1997. The revisions to the Water Quality Regulations included adoption of updated aquatic life criteria, human health criteria, and dissolved criteria for metals. These criteria for the “priority pollutants” are consistent with the national criteria published by EPA pursuant to Section 304(a) of the CWA.

The surface water monitoring program, discussed in Chapter III.A, includes sampling for many of these toxic pollutants. However, not all waters assessed for this report are monitored or even evaluated for toxic impacts. In fact, sampling for toxics is focused on rivers and streams while limited for lakes/ponds and estuarine waters. Current toxics monitoring is limited, however, to less than 55 rivers in the state. This data gap in toxics monitoring is being addressed in the state’s Comprehensive Assessment Monitoring Strategy.

Table 3H-1 indicates the size of Rhode Island waters assessed for toxics and of those waters, the size with elevated levels of toxics. In most cases, metals are the toxic parameters of greatest concern, particularly lead and copper. The waters assessed as impaired due to violations of metals criteria and summarized in Table 3H-1 below as waters with elevated levels of toxicants, have been included on the state’s 303(d) list of impaired waters. It is important to note that the monitoring data for metals in many of these waters show violations of criteria, however, much of the data is expressed as total metals. The state has recently adopted metals criteria expressed as dissolved metals. Therefore, in many waterbodies, it is not known whether these waters have “elevated levels of toxicants” based on dissolved metals criteria violations. The state has recently initiated sampling of this group of waterbodies to address this issue and is working to collect dissolved metals data in all monitoring projects.

Table 3H-1 Size of Waters Affected by Toxic Substances

Waterbody Type	Size Monitored for Toxicants	Size with Elevated Levels of Toxicants
Estuarine (sq. miles)	9.65	8.33
Lakes (acres)	1710.9	706.7
Rivers (miles)	327.85	136.56

## 2. Public Health/Aquatic Life Impacts

### a. Fishing Advisories/Bans

All states in the northeast have issued fish advisories for mercury and other contaminants, warning residents, particularly children and pregnant women, to limit ingestion of certain fish species or fish caught in particular waterbodies. Unlike other northeast states, Rhode Island has not supported a routine surveillance program for fish tissue and lacks data for extensive site- or species-specific advisories. Instead, the RI Department of Health (HEALTH) issued a “Common Sense” press release in 1997 and again in 2000, for the consumption of fish from Rhode Island waters. HEALTH recommended following three simple steps to help enjoy the health benefits of seafood in a balanced diet while minimizing the exposure to chemicals of concern found in certain species and in urban rivers: 1) prepare seafood safely - this includes cleaning, skinning, removing fat and fatty tissue along the lateral line, 2) choose seafood wisely - limit consumption of species at high risk for contamination (shark, swordfish, bluefish, striped bass, certain freshwater fish) to one meal per month, and 3) vary your diet - both with respect to species and location of fish caught for consumption. Rhode Island’s limited data set on mercury was posted on the HEALTH website, and two specific advisories were issued: refrain from eating any fish from the lower Woonasquatucket, and bass from Quidnick Reservoir.

The OWR and USEPA, Region I have created a Workgroup focused on the issues of urban rivers. Participants include representatives from DEM, EPA, DOH, Department of Transportation, Narragansett Bay Commission, Coastal Resources Management Council, and various environmental advocacy groups. The issues of fish advisories and fish tissue monitoring programs for Rhode Island’s urban rivers is being addressed by this workgroup. In the spring of 1997, RI initiated a small monitoring program to measure mercury levels in fish. This monitoring has been limited since its initiation. Only a small number of waterbodies and fish have been tested for contaminants. These tests, along with more thorough testing across New England, show that fish can contain unsafe levels of mercury, dioxins and polychlorinated biphenyls (PCBs). Based on these test results, the RIDOH in April 2000 issued the following advise to reduce exposures to chemical contaminants:

- **Fish in different places to vary your diet.** Contaminant levels are different for each pond or river and each type of fish. Choose fish and ponds that test low in contaminants.
- **Choose smaller fish to eat.** Fish accumulate contaminants as they grow.
- **Choose stocked trout, which are raised in hatcheries, or sunfish and similar fish to eat.** Freshwater bass, pickerel, pike and yellow perch generally have higher levels of mercury than sunfish and similar fish.

The RIDOH has issued the following fish consumption advisories:

- **Do not eat any fish from the Woonasquatucket River below Smithfield** due to dioxin, PCB and mercury contamination.
- **Do not eat bass from Quidnick Reservoir** due to mercury contamination.
- **Limit consumption of the following saltwater fish to one meal per month:**
  - Stripped bass and Bluefish due to PCB contamination.
  - Swordfish, and Shark due to mercury contamination.

b. Pollution Caused Fish Kills/Abnormalities

A procedural policy has been developed to streamline RIDEM response to fish kills, and to delegate authority and tasks between RIDEM Division of Fish and Wildlife (DFW) and the Office of Water Resources (OWR). In general, DFW fisheries biologists investigate normal single-species kills (e.g., menhaden), and the OWR personnel are contacted immediately if evidence indicates a possible pollution-related event (multi-species kill/evidence of toxic contamination, etc.).

During 1998 and 1999, 12 fish kill events occurred in Rhode Island waters (Table 3H-2). None of these events were linked to toxic pollutants as the cause of the fish kills. The most frequent suspected cause in fresh and salt water was localized low dissolved oxygen (D.O.). The low D.O. appears to be caused by the accumulation of bottom algae growth (saltwaters) (Table 3H-2 #s 4, 6, 9 and 11) or water column algae blooms (freshwaters) (Table 3H-2 #s 1, 2, 5 and 12). The resulting algal problems may be due to combinations of excessive nutrients and/or flow restrictions caused by poor natural flushing. One kill (Table 3-H2 #7) was linked to a potential accidental heavy application of algaecide, used for the management of a water supply. Another kill (Table 3H-2 #10) was caused by a local power plant intake, entraining a school of menhaden fry. The remaining kill (Table 3H-2 #3) appears to have been naturally caused by a winter disease evident during ice out.

TABLE 3H-2 Species and Counts for 1998-1999 Fish Kills

Location/Cause	Species	Numbers	Date
1) Catch basin of Nelson Pond/Middletown low DO/	Yellow Perch White Perch	15 (1000-stressed) 2	February 9, 1998
2) Chapman Pond/Westerly Landfill nutrients/low DO under ice	Sunfish	200	March 6, 1998
3) Larkin Pond/South Kingstown winter mortality/disease	Sunfish	<100	March 6, 1998
4) Greenwich Bay/East Greenwich algal bloom/low DO	Cunner	<10 (100's-stressed)	July 15, 1998
5) Moshassuck River low DO	Suckers Sunfish	3 3	July 29, 1998
6) Bullocks Cove/East Providence low DO	Horseshoe crabs	>24	August 8, 1998
7) Stafford Pond/Tiverton algal treatment of drinking water supply	Yellow Perch	100's	August 1, 1998 August 21, 1998
8) Buckeye Brook/Warwick low DO – airport and non-point runoff	Alewife	>200	May 12, 1999
9) Greenwich Bay/East Greenwich algal bloom/low DO measured	Multi-species	(100's-stressed) no deaths	July 26, 1999
10) Providence River/Providence entrainment by power plant	Menhaden	>10,000 Length <3 cm. each (fry)	August 20, 1999
11) Ninigret Pond/Charlestown algae (ulva)/low DO	Blue crabs	4-5	August 24, 1999
12) Woonasquatucket River low DO	Menhaden	1,000 length <3 in (fry)	September 7, 1999

c. Sites of Known Sediment Contamination

National sediment criteria have not yet been established and there are no numerical sediment criteria in Rhode Island's Water Quality Regulations. Consequently, sediments are not routinely sampled as part of the state's ambient monitoring program. Sediments are evaluated under two programs in OWR: dredging and disposal, and ecological risk assessments. Both of these areas of sediment assessment are addressed in relation to programs carried out by the RIDEM Office of Waste Management.

Marine sediments have also been sampled for non-regulatory purposes by research groups, sponsored in part, by DEM's Office of Water Resources. This data includes baywide surveys of sediment contamination by the Narragansett Bay Estuarine Program (1988 and 1989) and, more recently by the University of Rhode Island Graduate School of Oceanography (1992, 1995 and 1998) which involved about 90 status and trend sites. In the absence of sediment criteria, this data has been compared to literature benchmarks and background statistics in order to evaluate the potential for effects. Some of this recent sediment data has resulted in additional sampling, source investigation and pollution abatement.

i. Sediment Classification and Dredging

The characterization of sediment contamination in Rhode Island marine and fresh waters has been primarily used as a necessary tool in evaluating private or public dredge disposal projects. The classification of sediments into Class IA, I, II, and III (Table 3H-3) is used to characterize material intended for disposal and to assess the suitability of the proposed disposal location. This initial data screening resource for selected pollutant constituents has been developed by the RIDEM Offices of Waste Management and Water Resources. This classification system does not apply to sediments intended for open water disposal.

The classification of these sediments into Class IA, I, II, and III (similar to a State of Connecticut method) is an attempt to predict contaminant levels of similar project areas, without excessive sampling and analysis. The available data to date seems to classify sediments of like areas (adjacent land use and percent solids) into similar categories of pollutant levels within the New England area. Analysis of marine and fresh water sediments in Rhode Island via the screening classification, bulk sediment chemistry analysis, and the Toxicity Characteristic Leaching Procedure (TCLP) methods have not indicated sediment contamination levels resulting in water quality classification violations, nor do results differ greatly from pollutant levels expected.

**Table 3H-3**  
**Initial Data Screening for Expected Pollutant Concentrations in**  
**Class IA-III Sediments (Metals in ppm)**

<b>PARAMETER</b>	<b>Class IA</b>	<b>Class I</b>	<b>Class II</b>	<b>Class III</b>
% Silt/Clay		60	60-90	90
% Solids	75	60	60-40	40
% Volatile Solids	1	5	5-10	10
% Hexane Soluble Fraction	0.1	0.5	0.5-1.0	1.0
Total Petroleum HC	-	-	-	300 ppm
PCB's	-	-	-	10 ppm
<b>TOTAL METALS (ppm)</b>				
Arsenic (As)	5	10	10-20	20
Cadmium (Cd)	1	5	5-10	10
Chromium (Cr)	10	100	100-300	300
Copper (Cu)	10	200	200-400	400
Lead (Pb)	25	100	100-200	200
Mercury (Hg)	0.5	0.5	0.5-1.5	1.5
Nickel (Ni)	5	50	50-100	100
Vanadium (V)	25	75	75-125	125
Zinc (Zn)	25	200	200-400	400

ii. Ecological Risk Assessments

In coordination with the Office of Waste Management, the Office of Water Resources reviews ecological risk assessments in order to determine if ambient conditions are in conformance with Water Quality Regulations. The types of projects that are involved include Superfund sites in various stages of evaluation. The reviews are based upon the physical, chemical and biological data from the ecological assessments. In the absence of sediment criteria, the data is also compared to literature benchmarks and background statistics in order to determine effects and the possibility for remediation. Several sites have evidence indicating the potential for sediment contamination, including some, which have resulted in planned remedial action, as discussed below:

aa. McAllister Point Landfill

McAllister Point Landfill is located in Middletown, Rhode Island, in the central portion of the Newport Naval Base and is situated between Defense Highway (Burma Road) and Narragansett Bay. This landfill is 11.5 acres in size and was created by filling in portions of Narragansett Bay. During the years it was operational, 1955-1975, it received wastes from operational areas (machine shops, ship repair, NUSC, etc.), domestic refuse, and from the 55 ships that were home ported at Newport. Materials reportedly disposed of include spent acids, paints, solvents, waste oils (diesel, lube, and fuel), and PCBs.

The landfill is part of the NETC Superfund site and as such it is subject to EPA and State oversight. The initial ROD for this site was for source control which included a RCRA Subtitle C Cap. As part of the management of migration ROD a second ROD for source control was to be produced prior to the start of construction of the cap. This ROD would address management of migration of groundwater into the Narragansett Bay (The only surface water body affected by the site), landfill gas emissions and the need to remediate contaminated sediments). This did not occur. The management of migration ROD was to evaluate groundwater, ecological, landfill gas, and the possibility of placing sediments under the cap. In February of 1994 stipulated penalties were assessed against the Navy for failure to submit on time Ecological Risk Assessments and Remedial Investigations for McAllister Point Landfill and the Old Fire Fighter Training Center. In June of 1995 settlement was reached which resulted in a fine against the Navy. The Navy also agreed to remove ten thousand cubic yards of contaminated sandblast grit from Derecktor Shipyard and place it under the cap at McAllister Point Landfill. During December 1994 construction began on a RCRA Subtitle C Cap at the landfill which was completed in 1996. In 1996 a series of borings in the sediments adjacent to the site confirmed that landfill material extend into Narragansett Bay. These materials were estimated to be up to fifteen feet at the toe of the landfill and extend more than one hundred feet into the bay in some locations. In 1997 the Human Health and Ecological Risk Assessment Reports were completed for the sediments adjacent to the site. Elevated levels of metals, SVOCs and PCBs were found in site sediments

and both reports concluded that these sediments represented an unacceptable risk to human health and the environment. Preliminary Remediation Goals, (sediment cleanup standards) were developed for site sediments. In 1999 a Marine Sediment Management of Migration Feasibility Study was completed which evaluated various remedial alternatives, including capping and dredging of contaminated sediment. In 2000 the Marine Sediment Management of Migration Record of Decision was signed for the site. This document called for the dredging of highly contaminated sediments and monitoring of sediments which represented a low risk.

bb. Derecktor Shipyard

Derecktor Shipyard is located in Newport, RI, in the central portion of the Naval Education and Training Center along Coddington Cove and the southern area of Defense Highway (Burma Road). The site is approximately forty-one acres in size. The shipyard was leased to RIEDC (formerly RIPA) in 1979 which subleased the land to Robert E. Derecktor for a shipbuilding facility. The yard was used for heavily industrialized repair, maintenance, and construction facility for private and military ships from 1979 to 1992. During its operations period the shipyard was cited for a number of environmental violations for onshore and off shore activities, including dumping of contaminated sandblast grit directly into the bay from operations carried out on the shipyard and associated dry docks. The shipyard filed for bankruptcy in October 1992. Hazardous and solid wastes were left behind.

That same month EPA proposed adding Derecktor Shipyard as a Study Area Screening Evaluation (SASE) as part of the EPA/State/Navy Superfund Federal Facility Agreement (FFA) as such, it is subject to oversight by the EPA and the State. A preliminary site assessment was completed in May 1993. A sediment study and underwater video was conducted in the fall of 1993. Areas devoid of aquatic life were video during this study. During 1993 and 1995 two removal actions for both hazardous and solid waste were conducted at the site. Senator Chafee lobbied for allocation of \$1 million for environmental cleanup at the site in FY 95. During the summer of 1995, at the suggestion of RIDEM, ten thousand cubic yards of sandblast grit were removed from Derecktor Shipyard as part of the settlement of stipulated penalties for McAllister Point Landfill and Old Fire Fighting Training Area. Additional removal actions were conducted on shore for soils contaminated with PCB and solvents. Investigations and removal actions continue on the onshore portion. Human Health and Ecological Risk Assessments were performed on sediments adjacent to the site. Elevated levels of metals, SVOCs and PCBs were found in site sediments and these studies concluded that these sediments represented an unacceptable risk to human health and the environment.



cc. Old Fire Fighter Training Area

The Old Fire Fighter Training area is located in Newport, RI on the northern end of Coasters Harbor Island in Narragansett Bay. The site that is approximately 5.5 acres in size was used as a fire fighter training area from approximately 1944 to 1972. Waste oils were routinely spread on the site and ignited for fire fighter training purposes. At the end of its operational period the firefighter training apparatus was dismantled and the site was turned into a park and subsequently a day care facility. A Phase I and II Remedial Investigation has been performed on the site. Contaminates such as, VOCs, SVOCs, pesticides, PCBs and inorganics were detected in surface, subsurface soils and groundwater samples. Free product containing petroleum was also found in subsurface soils and in groundwater at the site. Groundwater at the site discharges to Narragansett Bay. Day care operations were terminated in 1994, however the site continued to be used as a park. The Navy reactivated day care operations at the site. Concerns over potential exposure problems resulted in the day care facility as well as the park being closed in 1998. An ecological risk assessment was performed on the sediments adjacent to the site. Elevated levels of SVOCs and metals were found in the sediments and the report concluded that the sediments represented an unacceptable risk.

dd. Tank Farm # 1

Tank Farm # 1 is a thirty-acre site located in Portsmouth, Rhode Island. This site contains six 1.1 million gallon underground storage tanks and two 2.3 million gallon above ground storage tanks. The facility, which is currently operated by the Defense Fuel Logistics Agency, is used to store diesel oil, fuel oil, jet fuel and high-octane gasoline. In the past it is believed that tank bottom sludge (approximately 6000 gallons) generated from cleaning of tanks was placed in onsite pits. In addition, as a result of a limited remedial investigation it has recently been determined that two of the tanks have leaked. Located immediately adjacent to the tank farm is the Melville Campground recreational pond. The site is a Study Area Screening Evaluation (SASE) site (part of the EPA/State/Navy Superfund Federal Facility Agreement (FFA)) however, due to budgetary constraints the State is the only regulatory agency involved in oversight. In 1996-1998, remedial actions were initiated and continue. Studies will be performed to determine whether known releases have affected the recreational pond.

ee. Tank Farm # 4

Tank Farm # 4 is an eighty-acre site located in Portsmouth, Rhode Island. This site contains eleven 2.5 million-gallon underground storage tanks. The facility, which is no longer active, use to store Number 6 oil and other oils. In the past it is believed that tank bottom sludge (approximately 190,000 gallons) generated from cleaning of tanks was placed in onsite pits. In addition, as a result of a limited investigation it has recently been determined that four of the tanks have leaked. Remedial

actions conducted at the site to date include the sealing of waste lines to the oil/water separator, removal of sludges and cleaning of said separator, and the removal of oil water and sludge from the all of the underground storage tanks. The Navy petitioned the Department for a waiver from the standard regulatory requirements for destruction of the tanks and has requested that the Navy be allowed to reballast the tanks with water. The Department granted this waiver based upon the fact that the tanks presented unique logistical problems and cost associated with normal demolition closure procedures for underground storage tanks of this size. In addition the Navy noted that demolition actions would potentially compromise or complicate and increase the cost of remedial actions for groundwater and soil at the site. Subsequent to obtaining Department approval, the Navy elected to demolish the tanks. Wetlands and a stream (Norman Brook) abut the site. The stream discharges to Narragansett Bay. The site is a Study Area Screening Evaluation (SASE) site (part of the EPA/State/Navy Superfund Federal Facility Agreement (FFA) however, due to budgetary constraints the State is the only regulatory agency involved in oversight. Groundwater, soil and sediments adjacent to the site have been found to be contaminated with VOCs, SVOCs and metals.

ff. NUSC Disposal Area

NUSC disposal area is site located in Middletown, RI. The site as used for the disposal of industrial and construction waste generated at the NUSC facility. It is believe that chemical wastes were disposed of directly into pits at the site. Barring funding problems a remedial investigation is scheduled for the site in the near future. The site is located immediately adjacent to a pond and stream which drains into Narragansett Bay. The NUSC Disposal site is a Study Area Screening Evaluation (SASE) site (part of the EPA/State/Navy Superfund Federal Facility Agreement (FFA) however due to budgetary constraints it is currently not being investigated. The tank site is under State jurisdiction.

gg. Gould Island Electroplating Shop

Gould Island Electroplating Shop is a seventeen-acre site located in the northern end of Gould Island. Extensive electroplating and degreasing operations was conducted at this site during WW II. Waste generated at the site includes muriatic acid, chromic acid, copper cyanide, sodium cyanide nickel sulfate and degreasing solvents. Waste from this shop may have been disposed of in an onsite septic system or in disposal pits. A limited study of sediments and shellfish located near discharge pipes from the shop was conducted in 1985. Sediment samples were found to contain elevated levels of metals when compared to the control stations. Samples of sludges and other materials were collected from various locations in the shop in 1992. A number of samples were found to contain hazardous levels of metals.

A power generation plant is located adjacent to the shop. This plant provided the electric power for electroplating operations conducted at the

site. The fuel tanks associated with this plant have been removed. A remedial action is currently being scheduled to determine the extent of contamination associated with releases from these tanks. Release associated with other industrial activities performed at this end of the island have also been detected. The site is a Study Area Screening Evaluation (SASE) site (part of the EPA/State/Navy Superfund Federal Facility Agreement (FFA) and as such is subject to oversight by the EPA and the State. The Navy has proposed demolished all of the structures on the site. The Navy has submitted remedial investigation work plans for the site, however, approval has not been granted due to concerns over the adequacy of said plans.

hh. Gould Island

Gould Island is a 56-acre island located in Narragansett Bay. The island was acquired by the Navy in 1914. During WWI the island was used for storage of high explosives. After the war the island was used as a seaplane hanger port, as a degreasing station for Naval ships and as a facility for testing, overhauling and construction of torpedoes. The Torpedo Station was disestablished in 1951. In 1973, as part of the Shore Establishment Realignment Program, 39 acres located in the southern end of the island was transferred to the State of Rhode Island. The remaining acreage was transferred to the state in 1989. The Navy has retained jurisdiction over 17 acres located in the northern end of the island. This land is used by NUWC. The land currently owned by the state, and has undergone limited investigations through the Formerly Used Defense site program. Approximately forty-nine sites have been identified at the State owned property. These sites included, underground storage tanks, facilities, landfills, release associated with past industrial practices, etc.

ii.. NUWC Building 179

Building 179 is a torpedo testing building located in the northern section of NUWC. The site abuts wetlands and a stream that drains into Narragansett Bay. This building was severely damaged during a routine test of a torpedo engine. Preliminary work was initiated on the repair of this building. At that time high levels of chlorinated solvents and torpedo fuel were discovered in the groundwater adjacent to an underground storage bunker associated with Building 179. Subsequently, high levels of VOCs were discovered during a series of test borings for the repair of the building. In 1996, NUWC submitted a remedial action work plan for the contaminated soils found beneath and in the vicinity of Building 179. A separate Remedial Investigation Work Plan was submitted for the area adjacent to and downgradient of the underground storage bunker. Remedial action and investigation activities have been initiated at both locations.

In 1997, the Navy initiated work on Building 179. The work entailed a Remedial Investigation of the site and reconstruction of the affected torpedo building. The Navy submitted the necessary information

to the DEM, Wetlands Section under the reconstruction effort. As such, it was not subject to expedite review under Site Remediation. As the normal wetlands review would result in loss of mission and shut down of the facility, the OWR worked with the Navy to expedite the wetlands review.

The Navy has essentially completed the removal action at the site. During the removal process an UIC was uncovered. In addition, soils from the removal action were found to be contaminated with low levels of F-listed waste and as such were sent out as hazardous waste. Phase I of the remedial investigation was completed in the summer of 1997. The results of the investigation revealed chlorinated solvent plumes outside of the expected areas of contamination. Additional investigations are scheduled.

jj. Melville North Landfill

The Melville North Landfill located in Portsmouth, RI. This site is situated in the Melville North area in a low-lying wetland type area along the Narragansett Bay shoreline that lies within the 100-year floodplain. The site is approximately ten acres in size and is currently owned by Melville Marine Industries. The site was used as a landfill from about the end of World War II until 1955, though sources have indicated sporadic use after this time. Wastes disposed of include spent acids, waste paints, solvents, waste oils (diesel, fuel, lube) and PCB's. The quantity of wastes disposed of is unknown. During visual inspections of the site areas covered with oil and oil sludge were found to be scattered throughout the site. There were mounds of oil-soaked soil that appeared to have been trucked to the site and dumped. These oil-contaminated mounds could be the oil sludge material obtained from the tank farms during tank cleaning operations, or the result of cleanup operations following oil spills. Surface soil, subsurface soil, groundwater, sediments and beach sands at the site was found to be contaminated with VOC, SVIIOC, metals, PCBs and other waste such as asbestos. Free product containing petroleum and PCBs was also found at the site.

The only regulatory agency involved with the site is the State. The Navy removed eight hundred cubic yards of PCB and petroleum contaminated surface soils in 1993. In 1995 ten thousand cubic yards of TPH, lead, and asbestos contaminated soil was excavated from the site. In 1998 various remedial alternatives were evaluated to address the remaining contamination. Due to the fact that the site is subject to periodic flooding and the nature and extent of the contamination, the Navy elected to remove the remaining contaminated soils. The removal action was also found to be cost comparable with other alternatives such as capping, and it does avoid problems associated with long term monitoring. To date approximately eight thousand yards of soil have been removed from the site. Remedial activities are scheduled to be completed in 2000.

#### kk. Blue Beach Disposal Area

Located in Quonset Point, North Kingstown, the site is approximately 13 acres in size and was used as a disposal area. The following are concerns with the site:

- The southeastern portion of the site has PCB contamination
- The southeastern portion of the site has buried drums for which the Division is currently reviewing a workplan for their removal
- A red maple swamp to the west of the site is contaminated with 2-methylnaphthalene, naphthalene, n-butylphthalate, and 1-methylnaphthalene which exceed eco-risk criteria.
- PCB's and pesticides are contaminants detected in the salt marsh sediment which may pose adverse risk to the benthic community.
- Surface water in both the salt marsh and red maple swamp have elevated levels of metals.
- There is oil contaminated soil in two areas of the disposal area.

In 1996-1997 drums were removed and an agreement was established to remove PCB contaminated soils and debris. Unresolved issues of concern include contaminated groundwater in an adjacent salt marsh.

#### ll. Kiefer Park Tank Farm

Located in Quonset Point, North Kingstown, this site is approximately 12.9 acres in size and contained six underground (USTs) 500,000 gallon fuel storage tanks. Three of the tanks stored aviation fuel and the other three tanks stored jet fuel. The primary contaminants are aromatic VOC's and petroleum hydrocarbons. In addition to free product at the site, a dissolved phase, at low concentrations, is heading toward the red maple swamp, located to the west of the site. This site is directly north of the Blue Beach Disposal Area. The ACOE has proposed, as an operable unit, the removal of free product. The ACOE anticipates that by removing the source (free product) that dissolved phase concentrations will abate, hopefully negating the need to remediate the dissolved phase. With more specifics about what the ACOE proposes the Division will approve this proposal with certain conditions. ACOE is preparing to pilot test a new remediation technology involving subsurface injection of hydrogen peroxide which oxidizes the floating product to carbon dioxide and water.

#### mm. Charlestown Naval Auxiliary Landing Field

This site is located in Charlestown Rhode Island and consists of a number of sites including three separate landfills, a fire fighter training area and underground storage tanks facilities. The site is located on 605 acres of land which is a wildlife refuge and public recreational facility run by the US Fish and Wildlife Service and the town of Charlestown.. Elevated levels of VOCs, SVOC, metals and PCBs have been found in samples taken from the site. A number of the sites abut wetlands or the adjacent saltwater pond. Elevated levels of SVOCs, TPF and metals have

been found in sediment and surface water samples taken at these locations. Additional remedial investigations are scheduled for the site..

nn. Old Quarry Disposal Area

The site is located in Quonset Point, North Kingstown and is approximately 20 acres in size. Waste material from the nearby air station was disposed of here from about 1968 to 1972. Chemicals of concern at the site included semi-volatile organics, pesticides/PCB's, and metals. The ACOE has requested a No Further Action for the site based on their investigations. The Division has requested that risk from the surface water pathway be evaluated before granting a no further action. Due to funding cuts the site is currently on hold. In 1997, ACOE issued what they considered to be the final Baseline Human Health and Ecological Risk Assessment Phase II. RIDEM deemed the report to be unacceptable in addressing the surface water pathway.

oo. Allen Harbor Landfill

Located in Davisville, Rhode Island the site is approximately 15 acres in size and was used from 1946 to 1972 for the disposal of waste materials generated by NCBC Davisville and Naval Air Station, Quonset Point. Wastes including municipal waste, construction debris, rubble, preservatives, paint thinners, degreasers, PCB, asbestos, ash, sewage sludge, 55-gallon chums, used mineral grit, and fuel oil have been placed at the site. Three phases of remedial investigations have taken place at the site. The results of these investigations have indicated soil contamination, shallow and deep groundwater contamination, and contamination to nearshore sediments. The Navy completed a RCRA Subtitle C cap for the landfill with the creation of wetlands on the shore side of the landfill in 1999. The site is currently in O&M.

pp. Photek/Rol-Flo Engineering Inc.

The Rol-Flo Engineering, Inc. property located on Liberty Lane in South Kingstown, Rhode Island, is a one acre parcel where mercury wastes from former operations were alleged to have been buried in the early 1960's. The site is bordered to the east and south by an undeveloped wooded area, which is part of the Great Swamp, and lies entirely within the Great Swamp Wildlife Reservation. The site is included on the USEPA CERCLIS list as the Photek, Inc. site and is also being investigated under RIDEM's Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases.

A remedial investigation confirmed conclusions that mercury-containing wastes in the former disposal area represent the principal source of mercury in the environment. Shallow groundwater beneath the former disposal area discharges to the adjacent wetlands, which are part of the Great Swamp, but groundwater is not a significant migration pathway for mercury in the environment.

Mercury is present in the wetlands sediments and surface water. In the wetlands surface water, the mercury predominantly occurs in unfiltered samples. Mercury concentrations in sediments decrease with distance from the delineated wetlands boundary and the southern property boundary. The area containing elevated mercury in wetlands is at least 2.5 acres. Dispersion of mercury on particulates by surface water runoff and by periodic flooding is believed to be the principal transport mechanism for mercury in the environment under current and historical conditions.

Chickasheen brook is the closest surface water body to the site. No site-related contaminants were detected in the Chickasheen Brook sediments downgradient of the point where runoff from the wetlands would be expected to discharge into the Brook, and no impact to the Brook from the site was observed by the consultant, ABB.

After approval of an Ecological Risk Assessment Work Plan, ABB collected additional sediment samples and plant tissue samples and performed an Ecological Risk Assessment that was submitted to RIDEM on March 13, 1997. ABB's conclusion was that "based on site-specific sediment, plant, and earthworm concentrations...the majority of wildlife receptors within the wetland, including avian and large mammal species, are unlikely to be at risk from exposure to mercury in the wetland sediments." Despite ABB's conclusions in the Risk Assessment, the Department negotiated hot spot removal in the wetlands.

Remedial actions were performed in 1998-1999. Remedial actions consisted of excavation of onsite source soils, and excavation of "hot spot" sediments in the wetlands. Contaminated soils/sediments greater than RIDEM's Industrial/Commercial Exposure Criteria was shipped offsite for proper disposal. Soils that were greater than the Residential Direct Exposure Criteria but less than the Industrial/Commercial Criteria were encapsulated onsite. After the remediation, the disturbed wetlands were replanted and the upland portion of the site was seeded. The Site is currently being monitored and all vegetation appears to be in good condition. An Environmental Land Usage Restriction (ELUR) is currently being negotiated between the Department and Rol-Flo's legal counsel.

#### qq. Rose Hill Regional Landfill

In 1994, EPA finalized a Remedial Investigation of the site. This report found that two surface water bodies are being impacted by the site: Saugatucket River and Mitchell Brook. The Saugatucket River runs immediately east of the bulky waste area of the site. Leachate outbreaks from the landfill have been observed on the west bank of the river. Sediment has been contaminated with chlorinated VOC's (esp. TCE) as well as aromatic VOC's, ketones, carbon disulfide, PAM's and pesticides. Additionally iron occurs in such abundance in substrate that it may make it unsuitable as a habitat for many benthic organisms. Lead, barium and manganese were also elevated downstream of the site. In surface water at

the Saugatucket River a few organic compounds (carbon disulfide, xylenes, 4,4' DDD and methoxychlor) were detected. As with the sediments, iron and manganese were found to be significantly elevated downstream of the site.

Mitchell Brook runs east of the solid waste area to its confluence with the Saugatucket River south of the site. Sediments of Mitchell Brook were found to be contaminated with VOC's (ketones, TCE, PCE, 1,2-DCE and chloroform) as well as BTEX compounds. PAM's and pesticides (4,4' DDE, 4,4' DDD and delta-BHC) were also detected. Metals did not seem to be significantly elevated in sediment downstream from the landfill. Surface water sampling detected carbon disulfide, 1,2-DCE and chloroethane as well as BTEX compounds and chlorobenzene. Several phthalates and acrylamide were also detected. Concentrations of iron and manganese were significantly elevated in the water column downstream of the site.

In 1994 NOAA produced a Preliminary Natural Resource Survey designed to study the effect of the elevated iron in the sediments on the survival of trout embryos. They reported to have demonstrated such effects. However, DEM found their conclusions questionable due to inconclusive results and methodologies.

EPA produced the Final Feasibility Study in 1998 for the site, and a Record of Decision (ROD) was issued by EPA in 1999. The ROD establishes an operable unit approach. Operable unit one is a source control remedy which requires excavation and consolidation of the Bulky Waste Area onto the Solid Waste Area, and capping and landfill gas control of the Solid Waste Area. Operable unit two address management of migration and will determine, after the source control remedy is in place and operational, if further remediation is required for groundwater and surface water control. It is anticipated that a Consent Decree will be finalized by the end of calendar year 2000.

rr. Picillo Farm Superfund Site

The Picillo Farm Superfund Site, located on Piggy Hill Lane in Coventry, Rhode Island was used as a pig farm while drums containing hazardous wastes and bulk wastes were illegally disposed into several unlined trenches during 1977. The wastes that were disposed of at the site included industrial solvents, oils, pesticides, PCBs, paint sludges, resins, still bottoms, and other hazardous materials. The disposal activities were discovered in September 1977 when an sodium aluminum hydride explosion and fire occurred at the site. Between 1980 and 1982 the trenches were excavated and approximately 10,000 drums were removed from the site.

In September 1993, the Record of Decision was signed which sets forth the selected remedy that includes thermally enhanced solvent vapor extraction (SVE) for cleanup of the soil and ultraviolet/oxidation for



remediation of the groundwater for the Picillo Farm Site.

The contaminants of concern (COCs) for groundwater are volatiles, semi-volatiles, metals and pesticides.

At the present, the site is in the remedial design phase. The SVE portion of the remedy has been pilot tested and was implemented throughout the entire site the summer of 1997. A residential well monitoring program has been initiated. As to date, all results have been below the MCLs. In 1997-1998, several revisions of the Institutional Control Plan and design reports of 30%, 60% and 100% were received for expected construction of the remedy in the fall of 1998.

ss. Mobil Oil Corporation, East Providence Terminal

The Mobil Oil Corporation, East Providence Terminal is located in East Providence, Rhode Island, and extends from it's western most border along the Providence River, to it's eastern most border along the Runnins River. The Department's classification of the site is as a State Remediation Project under the Office of Waste Management's Site Remediation Program. The site has operated as a bulk petroleum storage terminal from 1917 through the present, and as a petroleum refinery from approximately 1920 until 1975, refining light crudes into gasoline, fuel oils & asphalt. Since 1975 the terminal has stored gasoline, #2 fuel oil & diesel. Site investigations conducted during the past 3 years have revealed extensive soil, groundwater and surface water contamination throughout the site, most probably due to historical releases. The site is approximately 850 acres and is divided into 6 geographic areas. Two of those areas, the North Operations Area and the Runnins River Area are known or potential contributors of petroleum hydrocarbon impact to the Runnins River. Constituents of concern include volatile and semi-volatile compounds and metals associated with petroleum products. Of primary concern to the Runnins River are the BTEX compounds, naphthalenes and lead, which have migrated in the groundwater from the North Operations Area in the form of dissolved constituents, and have entered the Runnins River at several seep locations along the rivers western banks. At the current time a Perimeter Containment System (PCS) is pumping and treating groundwater and has eliminated all dissolved phase petroleum hydrocarbon contamination from the terminal to the river. An ecological assessment of the Runnins River was completed by Mobil in 1997. It identified impacts to the river from this site and recommended no further remedial action.

tt. Davis GSR Landfill Superfund Site

The Davis GSR Landfill is an approximately 21 acre landfill located in Glocester and Smithfield, Rhode Island. The landfill accepted solid waste, and purportedly some hazardous wastes, from 1974 through 1982.

The Chemicals of Concern (COCs) at the site are Arsenic, Benzene, Beryllium, and Manganese. A risk assessment was conducted as part of the December 1994 Remedial Investigation. This assessment found that risks existed for human consumption of off landfill groundwater and some adverse impacts were identified to off-site ecological receptors (predominantly to the east of the landfill). The overall ecological risk to Nine Foot Brook and Tributaries and to wetland species from landfill-related contaminants, however, was considered to be low. Arsenic was the primary contributor to the carcinogenic risk and manganese was the primary contributor for non-carcinogenic risks.

The Final Feasibility Study for the site was received in February, 1997 followed by a Proposal Plan in May, 1997. A No-action ROD was concurred by the State in September 1997. The site is now monitored annually through residential well monitoring. The 1999 monitoring results revealed no suspected site contaminants in the wells sampled.

uu. Davis Liquid Waste Superfund Site

The Davis Liquid site is an approximately 16 acre site located in Smithfield, Rhode Island (see attached map). The site served as a disposal area for various hazardous wastes throughout the 1970s. The wastes were disposed of in unlined lagoons by means of direct, bulk discharges and also in drums. A large volume of (estimated at about 16 million) used tires are also present in piles across the site.

In part due to the numerous site contaminants, and clean-up goals were not chemical specific, but rather based on total volatile organics (total VOCs). Total VOC is a measurement that quantifies the total concentration of all the volatile contaminants in the media in question. As a result, no specific chemicals of concern were specified in the 1986 Record of Decision. The primary contaminants on the site are chlorinated solvents, such as Trichloroethylene, 1,1,1-Trichloroethane and Tetrachloroethylene, other volatiles (such as toluene, ethylbenzene, benzene, and xylenes), some semi-VOCs (1,2 Dichlorobenzene and Bis(2-ethylhexyl)phthalate) as well as metals (arsenic, iron, and manganese) (see attached complete list of contaminants). The primary risk at the site is associated with human consumption of off-site groundwater. Although surface water tributaries and Latham Brook are also impacted. A comprehensive residential well monitoring program has been conducted by the RI Department of Health since 1980. Various contaminants have been detected during the sampling, and five residences in the vicinity of the site are currently on bottle water due to contamination of their drinking water wells.

The construction of the Davis waterline to serve the residents affected, or potentially affected, by site contaminants was completed in 1997. The source control portion of the remedy at the site (clean-up of soils) is currently scheduled to begin the summer of 1997 and the groundwater portion of the remedy (groundwater pump-and treat) is currently at the 90% design phase. It is unknown at this time when the

groundwater remedy will be implemented. In 1997, 775 drums and 750,000 tires were removed from the site under an EPA Unilateral Administrative Order. Over 800 samples were collected from various depths for the Remedial Design documents. Low-temperature thermal desorption will begin for soil treatment in the fall of 1999. The soil treatment is currently on-going with 15,000 tons of contaminated soil remediated as of 15 April 2000. Approximately 40,000 tons of contaminated soil remain to be treated and completion is expected in Spring of 2001.

vv. Hoechst Celanese Corporation

The Hoechst Celanese Corporation owns and operates a chemical manufacturing plant at 500 Washington Street in Coventry, RI which is located along the South Branch of the Pawtuxet River. Parts of the site are now designated as a hazardous waste site with the State of Rhode Island as the lead. Investigation and remediation activities have been ongoing since the discovery of high concentrations of chlorobenzene and dichlorobenzene in soil and groundwater along the lower raceway in 1992. A comprehensive site assessment and surface water characterization study were subsequently conducted. Free phase DNAPL was found in wells both onsite and across the river. A second source area was found in the Upper Mill Basins adjacent to the upper raceway. The chlorobenzene contaminated contents of the basins were excavated. Pilot tests of remedial alternatives for the surrounding soil and groundwater are currently underway. Strategies for the remediation of the DNAPL, soil and groundwater in the area of the lower raceway are being evaluated. Remediation of the soils and groundwater underlying the facility is expected to take several years.

ww. Central Landfill

The Central Landfill site covers approximately 155 acres of a 600-acre tract in Johnston. Licensed by Rhode Island and supported by State funds, this active municipal landfill receives approximately 85% of Rhode Island's solid waste. State records indicate that 1 1/2 million gallons of hazardous wastes generated within the State were disposed of at the site in 1978 and 1979. In 1982, the owner complied with a State order to close the areas that had received hazardous wastes. These areas have been excavated, backfilled, and capped to prevent further contamination of the groundwater surface water, and revegetated as part of the closure plan. Approximately, 4000 people live within 3 miles of the site. The nearest home is 1/2 mile away. Nearby private wells downgradient from the site are contaminated with solvents. The bedrock aquifer may be contaminated and the adjacent wetlands may also be affected. Cedar Swamp Brook, used for recreational boating, flows southeast along the southwest perimeter of the site.

The groundwater and surface water are contaminated with volatile organic compounds (VOCs), including toluene and methylene chloride

from disposal of solvents. People who come in direct contact with or drink water from nearby wells are under potential health risk, because the groundwater is reported to contain elevated lead levels. Cedar Swamp Brook and adjacent wetlands may also contain contamination. The site is being addressed in a single long-term remedial phase focusing on cleanup of the entire site. In 1996-1997, the Remedial Investigation and comments were provided to EPA and the Draft Feasibility Study for Operable Unit 2 was received and is under review.

xx. Landfill and Resource Recovery, Inc.

The Landfill and Resource Recovery, Inc., site is a 28-acre landfill on a 36-acre parcel of land. The site was originally a sand and gravel pit and was used for small-scale refuse disposal from 1927 to 1974. In 1974, the site was sold and developed into a large-scale disposal facility accepting commercial, municipal, and industrial wastes. Until 1979, an estimated 1 1/2 million gallons of hazardous wastes were accepted and co-disposed with other wastes in the central portion of the landfill. The hazardous wastes included many types of bulk and drummed organic and inorganic materials in liquid, sludge, and solid forms. Landfilling of commercial and residential wastes continued until 1985. In 1979, the operator placed a polyvinyl chloride cover over the area containing hazardous waste to prevent rainwater from entering. In 1985, the owners closed the landfill and placed another synthetic cover over nearly the entire landfill. Soil was placed over the synthetic cover and it was partially planted with vegetation. Although the area is still rural, there are approximately 10,000 residents in a 25-square-mile area; the area appears to be undergoing a substantial growth in residential development. Within a 1/2-mile radius of the site, there are fewer than 50 residences and no multi-residential housing development. More than 3,000 people live within 3 miles of the site. An industrial park is located approximately 3,000 feet to the north, and Air National Guard installations are approximately 1,000 feet to the east and 3,000 feet to the south of the site. Most, if not all, residences in the site vicinity obtain their drinking water from individual wells. Trout Brook, adjacent to the site, and the Slatersville Reservoir, into which it discharges, are used for fishing and other recreation, but are not public water supply sources.

The air at the land fill vents is contaminated with volatile organic compounds (VOCs) including carbine tetrachloride, chloroform, and benzene. The groundwater on site is contaminated with arsenic, lead, and VOCs from waste liquids disposed of on site and from rainwater entering the landfilled wastes and causing contamination to move into the groundwater. The surface water on the site is contaminated with lead. The only health threat is from gaseous emissions from the landfill. The landfill is enclosed by a single-strand fence. The only significant environmental threat is to the wetlands surrounding the site. The wetlands are being affected by sand eroding from the landfill. the eroded sand is not contaminated; however, it is filling in the wetlands, destroying vegetation and decreasing the ability of the wetland area to support plant and animal

life. The site is being addressed in a single long-term remedial phase focusing on cleanup of the entire site. Closing the landfill, installing a cover, and constructing a fence to limit access to the site have reduced the potential for exposure to hazardous materials at the Landfill and Resource Recovery site, while awaiting further cleanup activities to begin.

yy. Western Sand & Gravel

Western Sand & Gravel, a 20-acre site located in a rural residential area of Burrillville, was a sand and gravel quarry operation from 1953 to 1975. The quarrying operation is continuing. From 1975 to April 1979, approximately 12 acres of the 20-acre site were used for the disposal of liquid wastes, including chemicals and septic waste. Over time, the wastes penetrated into the porous soil and contaminated the groundwater. Contents of the tank trucks were emptied directly into twelve open lagoons and pits, none of which were lined with protective materials. The pits were concentrated on a hill that slopes to Tarkiln Brook, which is used for recreational purposes and drains into the Slatersville Reservoir. The State closed the disposal operation because nearby residences complained of odors. Approximately 600 people depend on groundwater within a 1-mile radius of the site. Eight homes were found to have contaminated wells.

The on-site groundwater is contaminated with volatile organic compounds (VOCs), including toluene, trichloroethylene (TCE), trichloroethane, benzene, chlorobenzene, dichloroethane, and others. The water of Tarkiln Brook contains similar contaminants. The soil also is contaminated with VOCs. Prior to the capping of the soil and sludge and the installation of carbon filters, potential exposure to VOCs may have occurred by inhalation, swallowing, or direct contact with contaminated soil or groundwater.

The site is being addressed in four stages: initial action to limit the spread of contamination and three long-term remedial phases concentrating on installation of a permanent water supply, capping of the contaminated soil and sludge, and investigating the extent of groundwater contamination and cleanup alternative. The initial actions have included fencing and capping the contaminated areas of the Western Sand & Gravel site and installing the carbon canister filters. These actions have reduced the exposure potential, thereby protecting human health and the environment, while the site awaits further cleanup activities.

d. Shellfish Restrictions/Closures Currently in Effect

i. Shellfish Growing Area Monitoring Program

The Shellfish Growing Area Monitoring Program is part of the State of Rhode Island's agreement with the United States Food and Drug Administration's National Shellfish Sanitation Program (NSSP). The purpose of this program is to maintain national health standards by regulating the interstate shellfish industry. The NSSP is

designed to oversee the management programs in shellfish producing states and to enforce and maintain an industry standard. As part of this agreement, the State of Rhode Island is required to conduct continuous bacteriological monitoring of the shellfish harboring waters of the state, in order to maintain certification of these waters for shellfish harvesting for direct human consumption. Rhode Island collects samples from 17 separate shellfish growing areas. These growing areas encompass all of Narragansett Bay and its shellfish harboring tributaries, all the south shore coastal salt ponds, Little Narragansett Bay, Block Island, and the Off Shore area (See Table 3H-4). Each of the 17 growing areas incorporate anywhere from nine to 39 fixed sampling stations. Collecting bacteriological samples at all stations in one growing area on one day is considered one monitoring "run".

Water samples are collected monthly at the (9) nine stations in the Upper Narragansett Bay and the (2) two remaining open stations in the Warren and Barrington Rivers. Samples are also collected occasionally in the 14 closed stations. In 1998, 12 runs were made in those two areas, providing a total of 300 samples. The results are used to manage the Upper Narragansett Bay and Warren and Barrington Rivers, conditionally-approved shellfish growing areas.

Greenwich Bay, Mount Hope Bay and the Kickamuit River have been operating on a conditionally approved basis for the past several years. These areas are closed for a period of seven days following a wet weather event totaling 0.5" or greater. The areas are to be sampled monthly when they are open for shellfishing. Greenwich Bay is also an official management area overseen by the Division of Fish and Wildlife which restricts harvesting yield during the adverse winter season. The commercial harvesting of shellfish in Greenwich Bay is restricted to Mondays, Wednesdays and Fridays from 8AM to noon from mid-December through April. Pollution restrictions supersede management restrictions. Greenwich Bay was sampled 12 times in 1998 from the 19 monitoring stations located in the growing area which provided 228 samples. The results are used to manage Greenwich Bay as a conditionally-approved shellfish growing area. Mount Hope Bay and the Kickamuit River are also managed the same way, on a conditionally approved basis. There are 11 monitoring stations in the Kickamuit River and the area was sampled 12 times in 1998 providing a total of 120 samples. Mount Hope Bay has 16 monitoring stations and was also sampled 12 times in 1998 which provided 192 samples. Both growing areas are sampled at the same time and the results are used to manage the Mount Hope/Kickamuit River conditionally-approved shellfish growing areas.

The other shellfish growing areas in Rhode Island are not subject to the volume and number of sewage discharges that effect the Upper Narragansett Bay, or the predictable nonpoint source impact that effects the Warren and Barrington Rivers, Greenwich Bay, Kickamuit River and Mt. Hope Bay. Accordingly, these other shellfish growing areas are monitored less frequently. In March 1981, the sampling program was expanded and has continued through the present. More recently, the emphasis has shifted to a trend-oriented monitoring program based on a random sampling methodology. At present, those growing areas that are approved for shellfish harvesting are sampled a minimum of six times a year. An attempt is made to sample growing areas a minimum of once a year where shellfish harvesting is prohibited. Due to the lack of potential pollution sources impacting the Off Shore growing area, it is classified as remote and therefore is required to be sampled only twice a year.

After collection, the water samples are returned to the RI Department of Health laboratory for analysis. The result of this analysis is a measure of the most probable number (MPN) of total and fecal coliform bacteria. Fecal coliforms are found in wastes from warm-blooded organisms. These bacteria are nonpathogenic (non-disease causing). Fecal coliforms do, however, serve as an indicator organism for the possible presence of other potentially pathogenic, sewage-associated microorganisms which can cause such diseases as cholera, hepatitis, and gastroenteritis. These diseases may be contracted by consuming sewage-contaminated shellfish. The State retains its certification by restricting shellfish harvesting to those areas that maintain total and fecal coliform levels below certain statistical parameters established by the State and agreed to by the FDA. Rhode Island, with the consent of the FDA, recognizes the following six different classifications of shellfish growing areas:

Approved - This status allows unrestricted harvesting of shellfish (unless restricted by conservation closures) for direct human consumption and is only allowed in areas free from harmful levels of pollution.

Conditionally Approved/Seasonal - This status prohibits shellfishing only during the summer months (Memorial Day weekend through Columbus Day weekend) due to the potential pollution from concentrations of boats with marine toilets during the boating season, and also areas with elevated bacteriological levels due to suspected nonpoint septic system leachate from summer residences.

Conditionally Approved - These areas change in quality due to rainfall-related problems such as combined sewer overflow discharge and/or sewerage system failures. These areas are from time to time found to be in an unsatisfactory condition for the taking of shellfish for human consumption and are then declared to be polluted and closed. In most cases, closure for seven days occurs following a rain event of greater than 0.5" within a 24-hour period in the Providence area. Notice of conditional closures is advertised in a daily newspaper in Providence.

Prohibited - This status prohibits the harvesting of shellfish on a year-round basis due to the presence of pollution during significant periods of the year.

Conditionally Restricted - These areas are used for shellfish relays only.

Remote - These areas have no human habitation and are not impacted by any actual or potential pollution sources.

ii. Changes in Shellfish Growing Area Status : 1998 - 1999

During the calendar year 1998 changes occurred in the status of shellfish growing areas (Table 3H-4). One Hundred Acre Cove was downgraded from conditionally approved to prohibited. A small area in Bristol Narrows was open and a small area in Potters Pond (Point Judith) was closed. In 1999 the small area in Potters Cove was reopened.

It should be noted that these upgradings/downgradings of certain areas to shellfish harvesting are strictly a result of bacteriological monitoring. These changes are representative of actual bacteriological water quality conditions and will remain as such until the results of future shellfish growing area monitoring justify additional changes. A summary total of acreages for all marine areas in RI and their NSSP classification is listed in Table 3H-5. Closed shellfish areas are shown in Table 3H-6 and Figures 3H-1, 2, and 3.



**TABLE 3H-4**  
**CHANGES IN STATUS OF SHELLFISH GROWING AREAS**  
1998-1999

Area	Reason for Change	Change	Year	Acres affected
Barrington River	Composite bacteria monitoring results exceed shellfish standard	approved to prohibited	1998	(-) 506
Potter Pond (Point Judith)	Composite bacteria monitoring results exceed shellfish standard	approved to prohibited	1998	(-) 18
Mt. Hope Bay	Improvement in water quality	prohibited to conditionally approved	1998	(+) 9
Potter Pond (Pt. Judith)	Improvement in water quality	prohibited to approved	1999	(+) 18

**TABLE 3H-4 (continued)**

**CHANGES IN STATUS OF SHELLFISH GROWING AREAS**

	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>
Total Acres Improved:	20	0	0	622	2543	2267	239	566	9	18
Newly Restricted:	571	552	2647	107	444	6929	567	124	524	0

**Upper Bay Conditional Area Closure-Rate\*, 1990-1998**

Year	1990		1991		1992		1993		1994		1995				1996				1997				1998			
Growing Area	AREA		AREA		AREA		AREA		AREA		AREA				AREA				AREA				AREA			
	A	B	A	B	A	B	A	B	A	B	A	B	Greenwich Bay*	Mt. Hope/Kick.*	A	B	Greenwich Bay*	Mt. Hope/Kick.*	A	B	Greenwich Bay*	Mt. Hope/Kick.*	A	B	Greenwich Bay	Mt. Hope/Kick
# Days Closed/Year	281	232	263	122	236	1040	232	88	202	98	205	76	205	256	252	107	184	197	219	76	177	184	244 ½	123	201	210 ½
% of Year Closed	77%	64%	72%	34%	65%	28%	64%	24%	55%	27%	56%	21%	56%	70%	69%	29%	49.8%	53.7%	60%	21%	48.6%	50.4%	67%	33.7%	55.1%	57.7%

June 1, 1990 - The Conditional Area was Divided into Areas A and B and Operated as Follows:

Area A - One-Half Inch (½) Rainfall or 0.5 mg By-Pass = Seven (7) Day Closure

Area A & B - One Inch (1") Rainfall = Seven (7) Day Closure

Areas A & B - Greater than 3" (>3") Rainfall = 10 Day Closure

Greenwich Bay/Mt. Hope Bay/Kickamuit River - One-Half Inch (½) Rainfall = Seven (7) Day Closure

\* = These values represent closures based on predictable pollution impacts and management

TABLE 3H-5

**Pollution Impact Sources and Present Shellfishing Status  
of all Rhode Island Marine Waters**

Area	PROBABLE IMPACT SOURCE												STATUS (ACRES)			
	WWTF Outfalls	CSO's	Storm Drains	Septic Systems	Suspected NPS	Industrial Discharge	Hazardous Waste Site	Seasonal Moorings	Marinas	Commercial/Industrial Docks	Navy Docks	Other water fowl	Approved	Conditionally Approved	Conditionally Approved/Seasonal	Prohibited
Old and New Harbors, Block Island								X	X	X			239		422	
Old Harbor Point, Block Island	X															1871
Winnapaug Pond, Westerly			X	?	?								489			
Quonochontaug Pond, Westerly/Charlestown			X	?	?								763			
Ningret Pond, Charlestown			X	X	X							?	1497			101
Green Hill Pond, So. Kingstown			X	X	X							?				429
Trustom Pond, So. Kingstown												X	157			
Pt. Judith Pond, So. Kingstown/Narragansett			X	?	X	X		X	X	X		?	1206			370
Potter Pond, So. Kingstown			X	X	?							?	372			
Scarborough Hills, Narragansett	X															2052
Tuckers Dock, Narragansett	X															866
Pettaquamscutt River, So. Kingstown/Narragansett/No. Kingstown			X	X	X							?				452
RI Sound & Mouth of Narragansett Bay													27,579			

Area	PROBABLE IMPACT SOURCE												STATUS (ACRES)			
	WWTF Outfalls	CSO's	Storm Drains	Septic Systems	Suspected NPS	Industrial Discharge	Hazardous Waste Site	Seasonal Moorings	Marinas	Commercial/Industrial Docks	Navy Docks	Other water fowl	Approved	Conditionally Approved	Conditionally Approved/Seasonal	Prohibited
Little Narragansett Bay and Pawcatuck River (Tidal Section)	X		X	?	X	X		X	X	X		?				1115
U.R.I. Bay Campus, Narragansett						X				X		X				52
Wickford Harbor, No. Kingstown			X	X	X			X	X	X		?			218	227
Bissel Cove, No. Kingstown				?	X											80
Quonset Point, North Kingstown	X		X			X	?			X						1207
Davisville, No. Kingston			?				?			X	X					71
Allen Harbor, No. Kingston					X		X	X	X	X						84
Greenwich Bay			X	X	X			?	?					2,543		
Greenwich Cove, East Greenwich	X		X		X			X	X							291
Chepiwanoxet, Warwick	X		X						X							87
Apponaug Cove, Warwick			X	?	X			X	X							115
Brush Neck Cove, Warwick			X	X	X			X								85
Old Warwick Cove, Warwick			?	?	X			X	X							144
Upper Narragansett Bay	?	X	X		X									10,210		
Providence River	X	X	X		X	X		X	X	X						5508
Barrington River	X		X		X			X	X							618
Palmer river	X		X		X							X				616
Warren River	X		X		X	X		X	X	X						362
Potter Cove, Prudence Island								X							102	

Area	PROBABLE IMPACT SOURCE												STATUS (ACRES)			
	WWTF Outfalls	CSO's	Storm Drains	Septic Systems	Suspected NPS	Industrial Discharge	Hazardous Waste Site	Seasonal Moorings	Marinas	Commercial/Industrial Docks	Navy Docks	Other water fowl	Approved	Conditionally Approved	Conditionally Approved/Seasonal	Prohibited
Bristol Harbor, Bristol	X		X		X			X	X	X					115	678
Melville, Portsmouth	X				?	X			X	X						376
Gould Island, East Passage				X			X									33
Newport Harbor and Coddington Cove	X	X	X		X			X	X	X	X					2845
East Ferry, Jamestown	X		X		?			X	X							837
West Ferry, Jamestown			X					X	X							265
South Shore, Newport				X									469			
Land's End to Sachuest Point, South Shore, Newport/Middletown													2,692			
East and West Passages			?		?								44,709			
Sakonnet River					?								12,562			
Sakonnet Harbor								X	X	X					13	
Nannaquaket Pond, Tiverton			X		X								205			
Nannaquaket Pond Channel, Tiverton										X						10
The Cove, Portsmouth			X	X	X								166			166
Island Park, Portsmouth			X	X	X								199			217
Kickamuit River, Bristol/Warren	X	X	X	?	X	X		X	?					360	104	
Mt. Hope Bay	X	X	X	?	X	X	?	X	X	X				1781		4,844
													93,264	14,663	1,239	26,809
													68.6%	10.8%	<1.0%	19.7%

TABLE 3H-6

**MARINE AREAS CLOSED TO SHELLFISHING**

May 1999 - May 2000

<u>Map ID#*</u>	<u>General Location of Waters*</u>
-----------------	------------------------------------

**Refer to Figure 3H-1 for Map ID # location.**

- |     |  |
|-----|--|
| 1.  | Allen's Harbor, North Kingstown                                |
| 2.  | Apponaug Cove, Greenwich Bay, Warwick                          |
| 3.  | Bristol Harbor   |
| 4.  | East Passage and Newport Harbor                                |
| 5.  | North End of Gould Island                                      |
| 6.  | Melville Area, Portsmouth                                      |
| 7.  | Brush Neck Cove, Warwick                                       |
| 8.  | Greenwich Cove, East Greenwich                                 |
| 9.  | East Ferry and Taylor Point Areas of Jamestown                 |
| 10. | Mount Hope Bay, Kickamuit River and vicinity                   |
| 11. | Southern part of The Cove in Portsmouth                        |
| 13. | Old Warwick Cove, Warwick                                      |
| 21. | Providence River   |
| 22. | South Kingstown WWTF Marine Outfall                            |
| 23. | Narragansett WWTF Marine Outfall                               |
| 24. | Old Mill Creek, Warwick  |
| 25. | Warren, Barrington and Palmer Rivers                           |
| 26. | West Passage, South Ferry, Narragansett                        |
| 27. | Wickford Harbor and vicinity                                   |
| 28. | Area of Quonset Point WWTF Marine Outfall and Commercial Docks |
| 29. | Area of Davisville Commercial Piers                            |

\*Exact Locations of Closure Lines are Available from RIDEM, Office of Water Resources

TABLE 3H-6 (Con't)

Map ID#*	<u>General Location of Waters*</u>
<b>Refer to Figure 3H-1</b>	
30.	Bissel Cove Area
31.	Pettaquamscutt (Narrow) River
34.	Baker Creek
35.	Castle Hill
35.	Mt. Hope Bay
37.(sc)	Bristol Harbor
38.(sc)	Jamestown Area
39.(sc)	Potter Cove, Prudence Island
40.(sc)	Sakonnet Harbor
41.(sc)	Wickford Harbor
42.(sc)	Kickamuit River
43.(sc)	Kickamuit River
44.(c)	Upper Narragansett Bay Area A
45.(c)	Upper Narragansett Bay Area B
46.(c)	Greenwich Bay
47.(c)	Mt. Hope Bay, Kickamuit River and vicinity

Seasonal Closure = (sc)

Conditional Closure = (c)

All others are closed year round.

\*Exact locations of closure lines are available from RIDEM, Division of Water Resources

TABLE 3H-6 (Con't)

Map ID#\*      General Location of Waters\*

**Refer to Figure 3H-2**

- 14. Pawcatuck River and Little Narragansett Bay
- 15. North End of Point Judith Pond, South Kingstown
- 16. Galilee Commercial Docks Area, South Kingstown
- 17. Jerusalem Docks, South Kingstown
- 18. Snug Harbor Docks, South Kingstown
- 19. Potter Cove Channel and Docks, South Kingstown

**Refer to Figure 3H-3**

- 12. Area of the Block Island (New Shoreham) WWTF Marine Outfall
- 36(sc). Great Salt Pond, Block Island
- 32(c). Ninigret and Green Hill Ponds, South Kingstown

Seasonal Closure = (sc).

Conditional Closure = (c); All others are closed year-round.

\*Exact locations of closure lines are available from RIDEM, Division of Water Resources



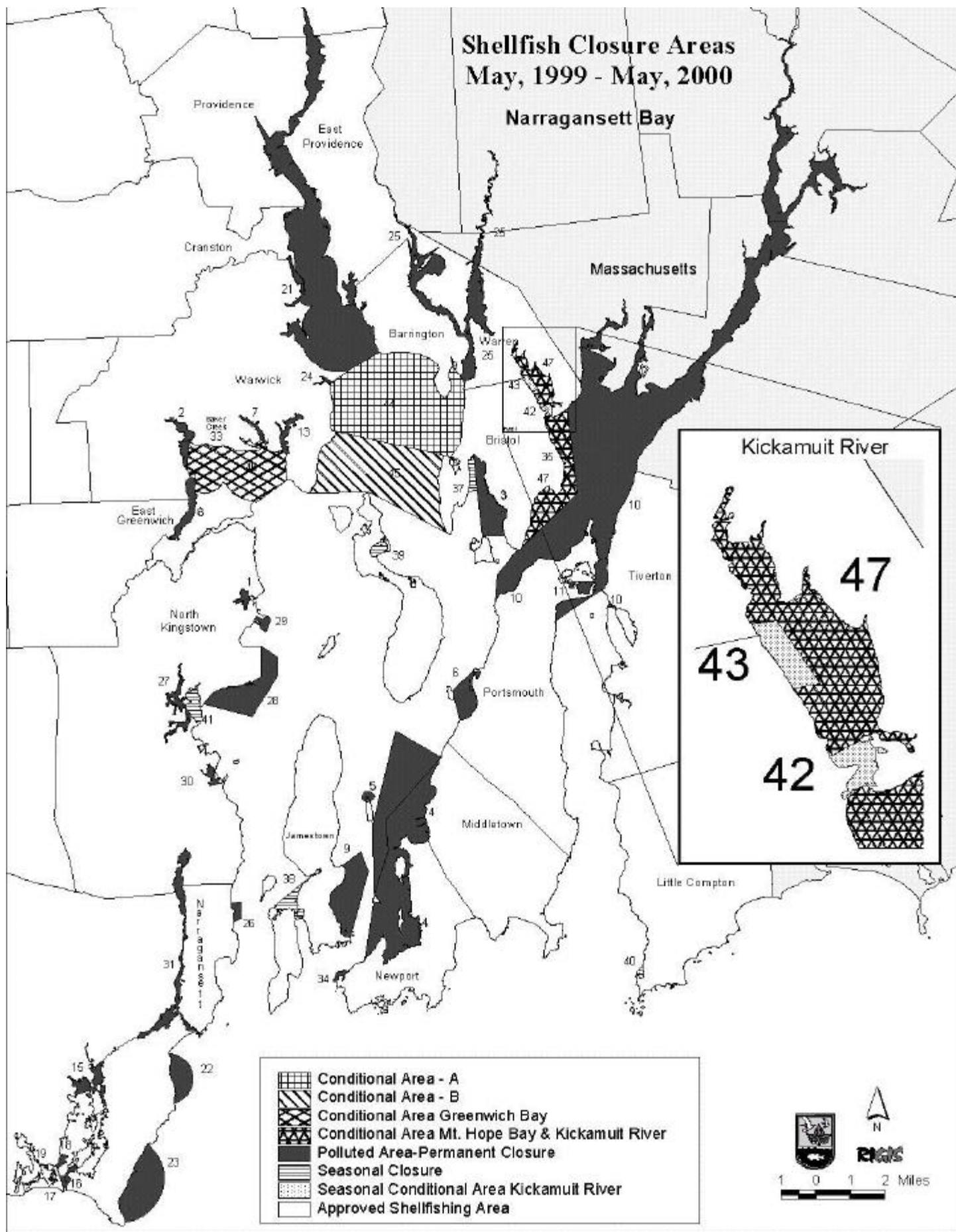


FIGURE 3H-1

FIGURE 3H-2

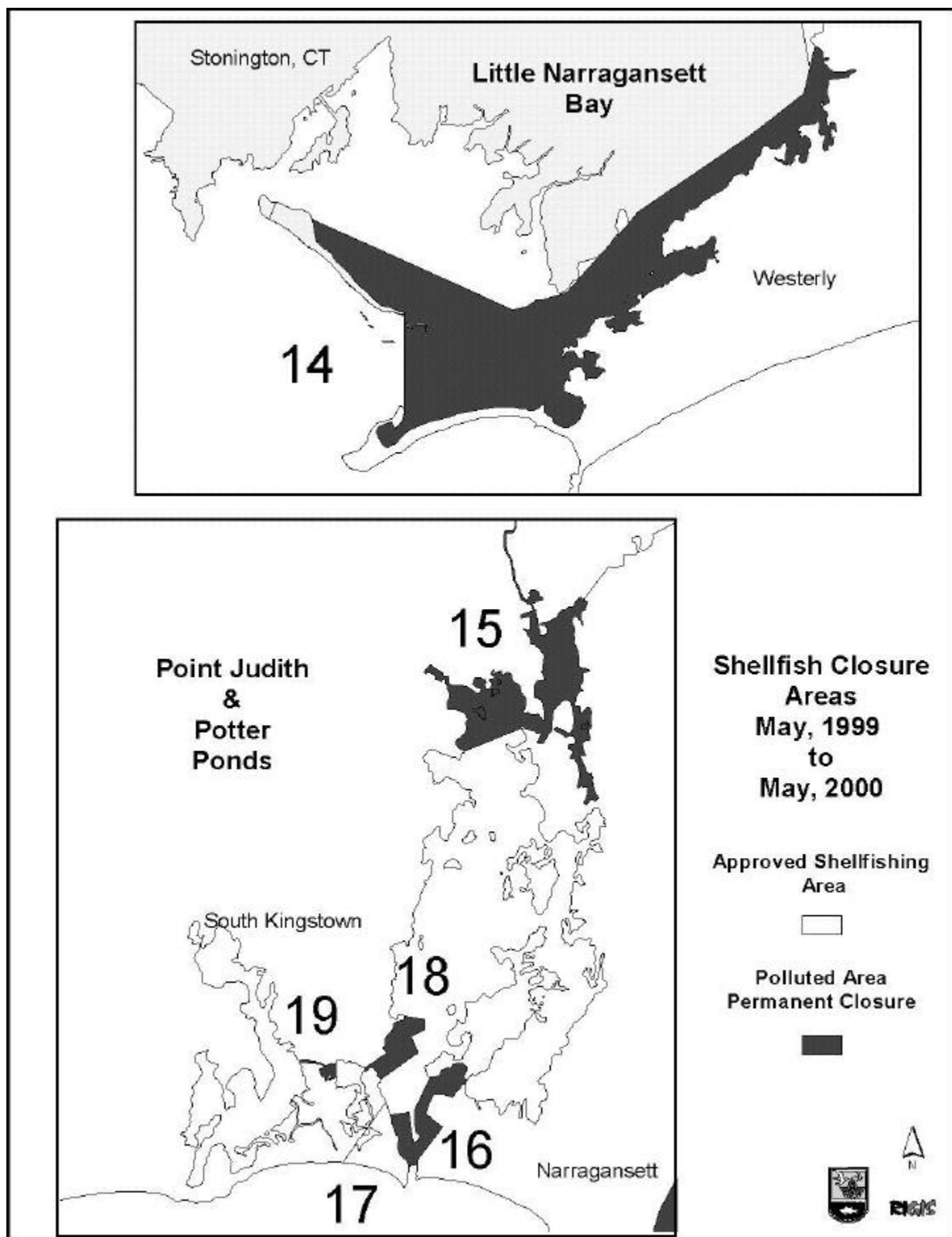
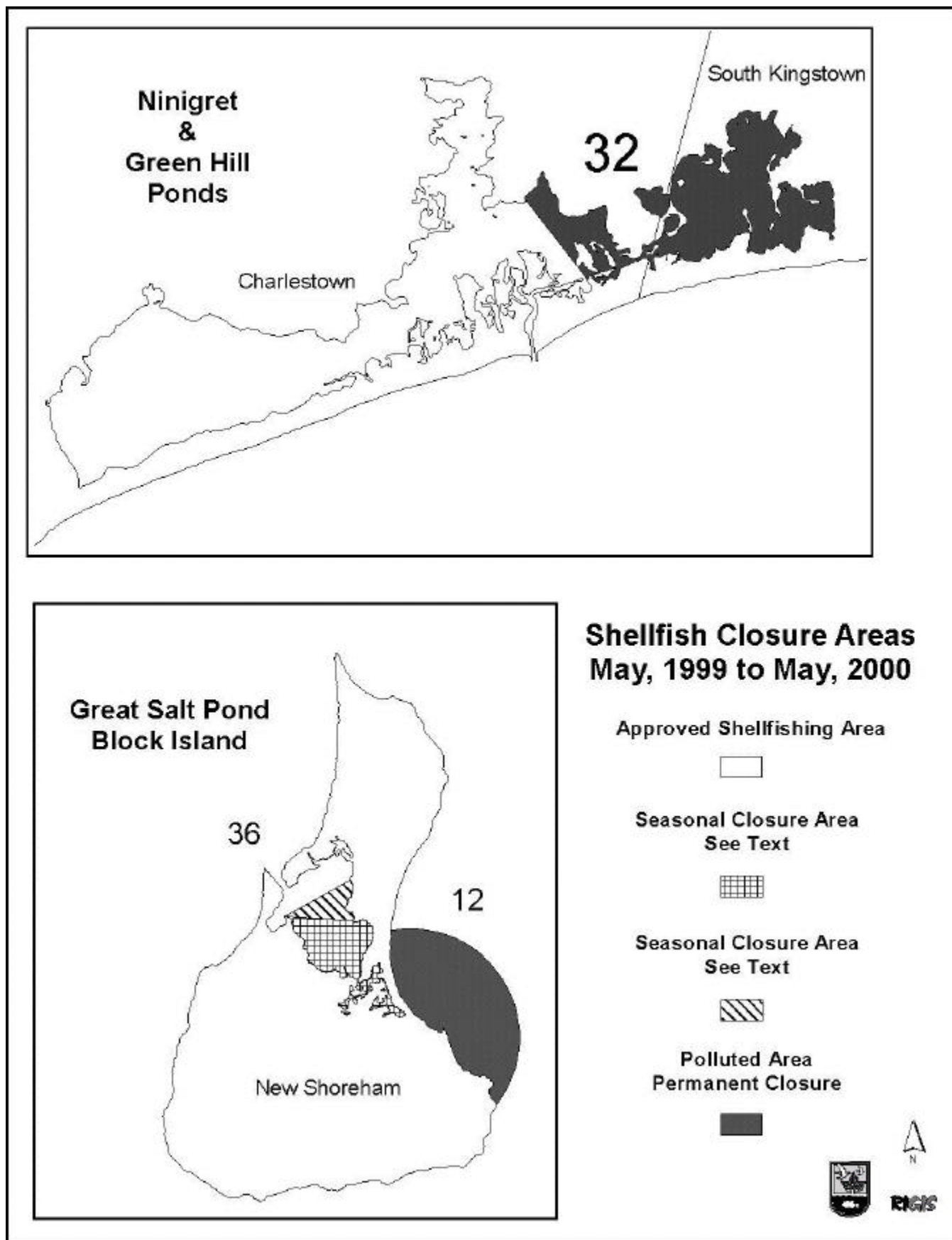


FIGURE 3H-3



### iii. Shoreline Surveys

As part of the NSSP requirements, the files for each shellfish growing area must be updated annually to maintain a shellfishable classification. This includes performing statistical analyses on at least the most recent 30 bacterial water sample results for each sampling station within an approved growing area and at least the most recent 15 bacterial water sample results for conditionally approved growing areas. The geometric mean and variability of the fecal coliform levels for each station are compared with the NSSP shellfish growing area criteria, and revisions to shellfish classification are made where necessary. Six bacterial sampling runs per year are taken in all approved areas, and 12 sampling runs per year are completed for certain conditionally approved areas (Upper Narragansett Bay, the Warren and Barrington Rivers, Greenwich Bay, Mt. Hope Bay and the Kickamuit River).

Shoreline surveys are an additional requirement of the National Shellfish Sanitation Program (NSSP). These surveys are necessary to determine shellfish classification in a particular growing area and to locate all actual and potential bacterial sources. Such surveys involve an intense examination of the shoreline to identify all running pipes and tributaries for bacteriological quality as well as calculating flow rates, and then evaluating the impact upon specific growing areas. Inactive pipe sources and drainage ditches are also documented for future reference and evaluation. A shoreline survey must be performed every three years for each approved and conditionally approved growing area to meet NSSP criteria. Annual shoreline survey updates are also required each year for all approved and conditionally approved growing areas to ensure they are appropriately classified and to re-evaluate pollution sources previously identified. Water quality statistical analyses from routine sampling runs are required in conjunction with the status of any pollution sources identified during previous shoreline surveys.

Sanitary surveys are conducted every 12 years at which time each growing area goes through a major re-evaluation involving statistical data review, new shoreline survey information, meteorological characteristics, hydrographic evaluations including time-of-travel estimates for known bacterial pollution sources with the potential to impact the area and dilution estimates for all known bacterial point sources. Table 3H-7 describes the areas surveyed in 1998 and 1999.

<u>Area Surveyed</u>	<u>Description</u>	<u>Date</u>
Pt. Judith & Potter Pond	South County shore ponds bordered by the Towns of Narragansett and South Kingstown.	Summer 1999
Ningret & Green Hill Ponds	South County shore ponds bordered by the Towns of South Kingstown and Charlestown.	Summer 1999
Winnapaug Pond	South County shore pond located in the Town of Westerly.	Summer 1999
Quonochontaug Pond	South County shore pond located in the Town of Westerly.	Summer 1999
Greenwich Bay	Waters west of a line from Sandy Point on Potowamut Neck to the flag pole at Warwick Country Club on Warwick Neck	Summer 1998
Upper Narragansett Bay	Are north of a line from Warwick Point Light to the northern extremity of Providence Point on Prudence Island to the southern extremity of Poppasquash Point in Bristol, and all of the shoreline south of a line from Adams Point in Barrington to Jacobs Point in Warren, and south of a line from Conimicut point in Warwick to Nyack Point in Barrington.	Summer 1998

e. Restrictions on Bathing Areas

The Rhode Island Department of Health (DOH) has the authority to close beaches in Rhode Island, along with municipalities for town beaches. Swimming advisories are generally established due to fecal coliform contamination of a waterbody.

In 1998, eleven (11) beaches were closed due to elevated levels of fecal coliform bacteria (Table 3H-8). Nine (9) of these beaches were closed for anywhere from 1 day to almost 1 month due to heavy rains in June which caused over 175 million gallons of sewage to be discharged into Narragansett Bay.

In 1999, seven (7) beaches were closed due to high fecal coliform counts (Table 3H-9). A swimmers itch advisory was issued for the Barrington Town Beach.

Table 3H-8

Rhode Island Department of Health  
Office of Food Protection

Beach Closures/Advisories  
1998

Beach	Date Closed	Date Reopened
Barrington Town Beach	6/16/98	7/10/98
	7/13/98	7/17/98
Bristol Town Beach	6/16/98	6/26/98
City Park, Warwick	6/16/98	7/13/98
Conimicut, Warwick	6/16/98	7/13/98
Fort Adams, Newport	6/17/98	6/18/98
Georgiaville Pond, Smithfield	7/15/98	7/24/98
Goddard Park, Newport	6/16/98	6/26/98
	7/03/98	7/07/98
King Park, Newport	6/17/98	6/18/98
	7/01/98	7/02/98
Lincoln Woods, Lincoln	7/20/98	7/23/98
Oakland Beach, Warwick	6/16/98	7/17/98
Warren Town Beach	6/16/98	7/24/98

Rhode Island Department of Health  
Office of Food Protection

Beach Closures/Advisories  
1999

Barrington Town Beach (Barrington)

On August 3, 1999, the Department issued a swimming advisory warning the public of the risk of getting swimmer's itch when swimming at the Barrington Town Beach. This advisory continued throughout the remainder of the summer.

Browning Mill Pond (Hope Valley)

The facility owner voluntarily closed the swimming area for the whole season due to a large population of birds in the area.

Camp Massasoit (Johnston)

The beach area in the Old Swamp Reservoir was closed on July 21, 1999 due to high fecal coliform bacteria levels. The beach was reopened on July 22, 1999 due to satisfactory bacterial test results.

Conimicut Beach (Warren)

The beach area was closed on September 1, 1999 due to high fecal coliform bacteria levels. The beach was reopened on September 2, 1999 due to satisfactory bacterial test results.

Goddard State Park (East Greenwich)

The beach area was closed on August 30, 1999 due to high fecal coliform bacteria levels. The beach area remained closed throughout the remainder of the summer season.

King Park & Beach (Newport)

The beach area was closed on August 8, 1999 and reopened on August 12, 1999. Also, the beach closed on August 18, 1999 and reopened on August 20, 1999. Both closure dates were due to high fecal coliform bacteria levels. Both reopening dates were due to satisfactory bacterial test results.

Lincoln Woods State Park (Lincoln)

The beach area was closed on July 9, 1999 and reopened on July 11, 1999. Also the beach closed on July 23, 199 and reopened on July 24, 1999. Both closure dates were due to high fecal coliform bacteria levels. Both reopening dates were due to satisfactory bacterial results.

Warren Town Beach (Warren)

The beach area was closed on August 30, 1999 due to high fecal coliform bacteria levels. The beach was reopened on September 1, 1999 due to satisfactory bacterial test results.



f. Restrictions on Surface Drinking Water Supplies

The Rhode Island Department of Health (RIDOH), Office of Drinking Water Quality is delegated to administer the EPA's Safe Drinking Water Act. The Office of Drinking Water Quality monitors approximately 500 public water systems, which include surface and groundwater supplies. This Office monitors both raw waters and the distribution system.

Since RIDOH requires filtration and disinfection for all surface waters, this report assesses surface water quality from the perspective of whether or not the water source required more than reasonable treatment. According to the RIDOH/Office of Drinking Water Quality, there have been no closures of surface drinking waters during 1998 and 1999 due to water quality problems in the surface water supply.

Summaries of drinking water use assessments are shown in Table 3H-10 for rivers and streams and in Table 3H-11 for lakes and reservoirs.

Forty-eight (48) rivers reviewed for this report are located within Drinking Water Supply systems. These 48 rivers represents 167 river miles. Almost all of these rivers are considered unassessed for drinking water use. This is because the Department of Health only requires water quality data, to evaluate the source water, to be collected from the terminal reservoir of the system. The terminal reservoir is the location of the intake pumps. In general, sampling conducted elsewhere in the system has been determined by the DOH to be too limited in scope to use in conducting a drinking water use assessment.

Forty-one (41) lakes assessed are used as drinking water supply sources. This represents 7,741 acres associated with the drinking water supply systems. Of these 7,741 acres, 5,662 acres (73%) are considered assessed for drinking water use for this report. The remaining 2,079 lake acres, or 27% were considered not assessed for drinking water use support. In general these 2,079 acres represent portions of the drinking water supply system that are upstream of the terminal reservoir. The terminal reservoir is the location within the drinking water supply system where the Department of Health requires the water samples to be collected. Some of these upstream waters are not monitored or have only limited monitoring and are, therefore, considered unassessed for this report. Ninety-nine percent (5,601 acres) of the drinking water supply lake acres assessed were found to be fully supporting, and less than 1% (5 acres) of the lake acres assessed fully support drinking water uses but are threatened. Approximately 1% (56 acres) of drinking water supply lake acres assessed are considered impaired for the drinking water use.

Table 3H-10 Summary of Drinking Water Use Assessments for Rivers and Streams

Total Miles Designated for Drinking Water Use <u>166.58</u>				
Total Miles Assessed for Drinking Water Use <u>4.83</u>				
Miles Fully Supporting Drinking Water Use	4.83	% Fully Supporting Drinking Water Use	100%	<b>Contaminants</b>
Miles Fully supporting but Threatened for Drinking Water Use		% Fully Supporting but Threatened for Drinking Water Use		
Miles Partially Supporting Drinking Water Use		% Partially Supporting Drinking Water Use		
Miles Not Supporting Drinking Water Use		% Not Supporting Drinking Water Use		

Table 3H-11 Summary of Drinking Water Use Assessments for Lakes and Reservoirs

Total Waterbody Area Designated for Drinking Water Use <u>7741.45</u>				
Total Waterbody Area Assessed for Drinking Water Use <u>5662.00</u>				
Acres Fully Supporting Drinking Water Use	5601	% Fully Supporting Drinking Water Use	99%	<b>Contaminants</b>
Acres Fully supporting but Threatened for Drinking Water Use	5	% Fully supporting but Threatened for Drinking Water Use	0.1%	Natural color
Acres Partially Supporting Drinking Water Use	56.2	% Partially Supporting Drinking Water Use	0.9%	Nutrients, excess algal growth, taste and odor, turbidity, pathogens
Miles Not Supporting Drinking Water Use	0	% Not Supporting Drinking Water Use	0	